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BOOK REVIEWS

Methods for Statistical Data Analysis of Multivariate Observations. By G. GNANADESIKAN, Wiley Interscience, New York, 1977, 311 pp.

This book is concerned with some of the more recent developments in multivariate methods. The emphasis is on practical methodology of statistical techniques which can be facilitated by computers. In particular, the coverage is divided into the following five general areas:

1. Reduction of dimensionality—principal components, factor analysis, etc.
2. Multivariate dependency—method of describing dependency.
3. Classification—discriminant analysis and clustering.
4. Assessment of distribution—test of normality, transformations, etc.
5. Summary and exposure—comparison of samples, outlines, etc.

The methods discussed are not new. However, there appears to be no similar book which puts together the materials presented. The author, who is a well known researcher, has made a definite contribution. Almost all methods are illustrated with numerical examples. A special feature is the many plots and displays which accompany the examples.

The book is written in an expository fashion but with both theoretical and applied readers in mind. The majority of the topics covered is not of an elementary nature, but the mathematical discussions tend to be sketchy. For this reason, readers without some previous knowledge of multivariate analysis using matrix rotation are not likely to benefit fully from the book. For example, its mathematical level is much higher than that of *Multivariate Procedure for the Behavioral Science* published by Wiley. It is not recommended to strictly applied readers. Despite the author's aim the book does not appear to be very suitable as a textbook, mainly because it has no exercises. This does not preclude, however, its use in seminars or other nonconventional courses, very common at the graduate level.

This book appears to be quite free from typographical errors and mistakes, although some innocent errors are noted, for example on p. 64 in discussing an exhibit. The style is lucid but gives the impression of wordiness in some places. The main negative feeling concerns the allocation of space to various topics. For example, fully one quarter of the book is devoted to testing normality and normalizing transformations. Although these are important, some of the space could have been allocated for other topics such an nonparametric techniques.

In summary, this book is a welcome addition to statistical literature and is recommended for statisticians. Not only will it provide some practical methods of handling multivariate data, it will motivate further research in a much needed area.

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Statistical Methods for Digital Computers. Edited by KURT ENSLEIN, ANTHONY RALSTON and HERBERT S. WILF, Wiley Interscience, New York, 1977, 454 pp. $24.95.

This book is Volume III in the series *Mathematical Methods for Digital Computers.* It deals, through a series of papers by well-known experts, with theoretical but mostly computational aspects of some recent important multivariate methods that are classified in the following parts (i) Regression and Discriminant Analysis (ii) Principal Components and Factor Analysis (iii) Cluster Analysis and Pattern recognition (iv) Time Series. These parts are numbered II through V in the book with Part I containing an introduction and an article on Monte Carlo methods as applied to the solutions of statistical distribution problems. Parts II, III and IV are prefaced by a note from the editors who not only provide a unifying introduction to each part but also give a symbol equivalency table for the different symbols used for the same quantities by the various authors.

Each method (with the exception of the Monte Carlo method in Part I) is presented according to a standard format that gives (i) the function of the method: (ii) mathematical aspects of the method: (iii) a summary of the calculation procedure; (iv) a flow chart (v) a description of relevant programs and subroutines; and (vi) a discussion of a sample problem. This format (also essentially used with Volume II of the series) effectively brings out the strongest feature of the series, namely, a unifying discussion of the current state of the theoretical art and the current state of the computational art.

The first paper by Kurt Enslein provides the unifying theme for the whole book by taking the reader on a "guided tour through the statistical computing garden". Enslein gives an expository review of all the methods and associated computational aspects such as tables of program availability and sources. He also shows in diagrammatic form sequences of techniques that are needed to achieve certain common goals in data analysis.

This book should be of interest to anyone concerned with the computational aspects of multivariate analysis procedures. However since it deals with very recent developments requiring rather sophisticated statistical analysis, the book would have appeal mostly to either the fairly mature applied mathematician who specializes in one or more related areas of multivariate analysis, or to statistical consultants interested in finding the appropriate method (or methods) for analyzing a given problem. The book has excellent references at the end of each paper which should be very useful to the general applied statistician or computer scientist who may wish to probe into recent theoretical and computational aspects of a particular method.

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